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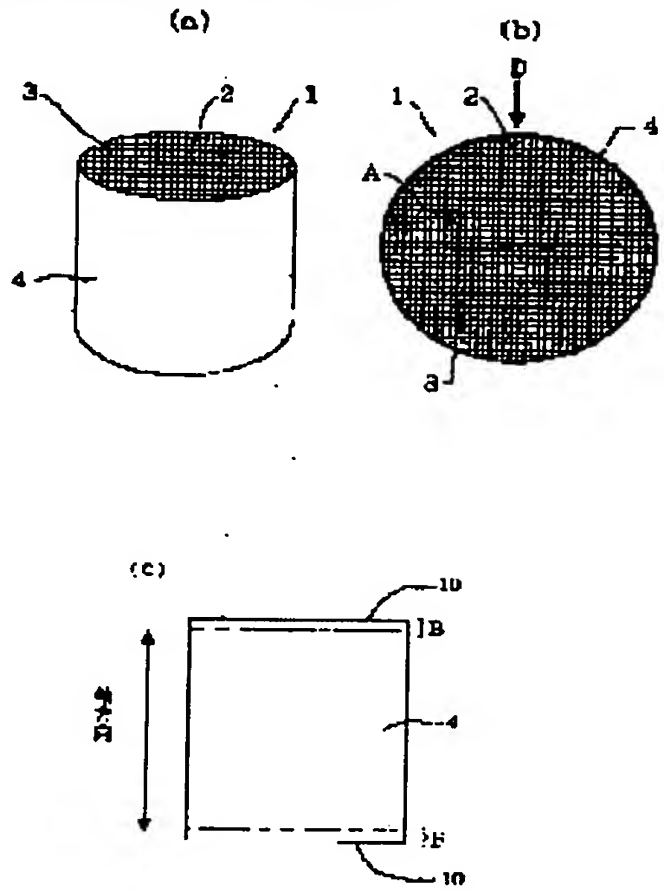
(71)Applicant : NGK INSULATORS LTD
(72)Inventor : KATO YASUSHI
NOGUCHI YASUSHI
OGAWA MASAHITO

(54) POROUS HONEYCOMB STRUCTURE AND METHOD OF PRODUCING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a honeycomb structure which satisfies requirements for the improvement of its cleaning performance and for the improvements of erosion resistance and canning property in a good balance, and which is preferably used as a carrier of a catalyst for cleaning the exhaust gas from automobiles.

SOLUTION: The honeycomb structure is constituted of porous cell partition walls 2 forming a composite body of a plurality of cells 3 each adjacent to one another and a porous honeycomb outer wall 4 for holding while surrounding the outermost cells situating at the outermost periphery of the composite body of the cells 3. In the honeycomb structure, the porosity is <30%, the fundamental wall thickness (Tc) of the partition walls 2 mentioned above is <0.076 mm, the average surface roughness (RaS) of the outer wall is ≥0.5 μm, and/or the average height (RzDINS) from the maximum point to the next minimum point of the surface of the outer wall 4 is ≥5 μm. The honeycomb structure contains a talc component and a kaolin component, and the talc component contains coarse particles having an average particle size of ≥7 μm and fine particles having particle sizes not larger than those of the coarse particles and the kaolin contains coarse particles having particle sizes of ≥7 μm and fine particles having particle sizes not larger than those of the coarse particles.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The cel septum of the porosity which forms the complex of two or more cels which adjoined, respectively, It is the honeycomb structure object which consisted of honeycomb outer walls of the porosity which surrounds and holds the outermost periphery cel located in the outermost periphery of this cel complex. While porosity is less than 30% 5% or more and the basic wall thickness (Tc) of said septum is 0.030 mm<=Tc<0.076mm The honeycomb structure object with which average surface roughness (Ras) of an outer wall is characterized by the average height (RzDINs) from the maximum point on 0.5 micrometer<=Ras <=10micrometer and/or the front face of an outer wall to the following minimum point being 5 micrometer<=RzDINs <=50micrometer.
[Claim 2] The honeycomb structure object according to claim 1 characterized by for said average surface roughness (Ras) being 0.5 micrometer<=Ras <=10micrometer, and the average height (RzDINs) from said maximum point to the following minimum point being 5 micrometer<=RzDINs <=50micrometer.
[Claim 3] The honeycomb structure object according to claim 1 characterized by for said average surface roughness (Ras) being 1.0 micrometer<=Ras <=10micrometer, and the average height (RzDINs) from said maximum point to the following minimum point being 10 micrometer<=RzDINs <=50micrometer.
[Claim 4] A honeycomb structure object given in claim 1 characterized by the numerical aperture (P) of a honeycomb structure object being 83% or more thru/or any 1 term of 3.
[Claim 5] A honeycomb structure object given in claim 1 characterized by the outer wall thickness (Ts) of a honeycomb structure object being 0.076mm or more thru/or any 1 term of 4.
[Claim 6] A honeycomb structure object given in claim 1 characterized by the average surface pole diameter of said outer wall being larger than the interior pole diameter of an average thru/or any 1 term of 5.
[Claim 7] A honeycomb structure object given in claim 1 to which average surface roughness (Rac) of said cel septum is characterized by the average height (RzDINc) from the maximum point of 0.5 micrometer<=Rac <=10micrometer and/or said cel septum front face to the following minimum point being 5 micrometer<=RzDINc <=50micrometer thru/or any 1 term of 6.
[Claim 8] A honeycomb structure object given in claim 1 characterized by the pore which has the pole diameter of 1 micrometers or more being more than 90 capacity % of total pore volume in a honeycomb structure object thru/or any 1 term of 7.
[Claim 9] Said outermost periphery cel as 1st origin cel [1st] to one within the 5-20th limits which follow the method of inside from there of the 1st terminal point cels A honeycomb structure object given in claim 1 to which each cel septum thickness (Tr1-Tr 5-20) is characterized by having the relation of 1.10 <=(Tr1-Tr 5-20)/Tc<=3.00 between said primitive cell septum thickness (Tc) thru/or any 1 term of 8.
[Claim 10] Said outermost periphery cel as 1st origin cel [1st] to one within the 5-15th limits which follow the method of inside from there of the 1st terminal point cels The honeycomb structure object according to claim 9 with which each cel septum thickness (Tr1-Tr 5-15) is characterized by having the relation of 1.10 <=(Tr1-Tr 5-15)/Tc<=3.00 between primitive cell septum thickness (Tc).
[Claim 11] Each cel septum thickness to one within the 3-5th limits which follow the method of inside from there considering the following cel which adjoins said 1st terminal point cel in the inner direction as 1st origin cel [2nd] of the 2nd terminal point cels so that it may become uniform thickness substantially The honeycomb structure object according to claim 9 or 10 characterized by having made it change so that it may become thin one by one toward the inner direction, and making the thickness of the thinest part in agreement with primitive cell septum thickness (Tc).
[Claim 12] The following cel which adjoins said 1st terminal point cel in the inner direction as 1st origin cel [2nd] Each cel septum thickness to one within the 3-5th limits which follow the method of inside from

there of the 2nd terminal point cels so that the cross section of each cel septum may become reverse trapezoidal shape The honeycomb structure object according to claim 9 or 10 characterized by having made it change so that it may become thin one by one toward the inner direction, and making the thickness of the thinest part in agreement with primitive cell septum thickness (Tc).
[Claim 13] The following cel which adjoins said 1st terminal point cel in the inner direction as 1st origin cel [2nd] Each cel septum thickness to one within the 3-5th limits which follow the method of inside from there of the 2nd terminal point cels The honeycomb structure object according to claim 9 or 10 with which the cross section of each cel septum is characterized by having made it change so that it may become thin one by one toward the inner direction at the shape of a spool, and making the thickness of the thinest part in agreement with primitive cell septum thickness (Tc).
[Claim 14] While having the relation of 1.10 <=Tr1/Tc<=3.00 between said primitive cell septum thickness (Tc), the cel septum thickness (Tr1) of an outermost periphery cel Each cel septum thickness (Tr1-Tr 5-20) to one within the 5-20th limits which follow the method of inside from there of the 3rd terminal point cels an outermost periphery cel as 1st origin cel [3rd] between primitive cell septum thickness (Tc) So that it may have the relation of 1.10 <=(Tr1-Tr 5-20)/Tc<=3.00 and the cross section of each cel septum may become reverse trapezoidal shape or the shape of a spool, and uniform thickness The honeycomb structure object according to claim 9 characterized by making it change so that it may become thin one by one toward the inner direction, and making the thickness of the thinest part in agreement with primitive cell septum thickness (Tc).
[Claim 15] A honeycomb structure object given in claim 9 characterized by the thing of said cel septum thickness (Tr1-Tr 5-20) for which it has the relation of 1.10 <=(Tr1-Tr 5-20)/Tc<=2.50 between said primitive cell septum thickness (Tc), respectively thru/or any 1 term of 14.
[Claim 16] A honeycomb structure object given in claim 9 characterized by the thing of said cel septum thickness (Tr1-Tr 5-20) for which it has the relation of 1.20 <=(Tr1-Tr 5-20)/Tc<=1.60 between said primitive cell septum thickness (Tc), respectively thru/or any 1 term of 14.
[Claim 17] The vertical section product to the shaft orientations of a honeycomb structure object is two or more [160cm]. An outermost periphery cel as 1st origin cel [1st] Each cel septum thickness (Tr1-Tr 10-40) to one within the 10-40th limits which follow the method of inside from there of the 1st terminal point cels between primitive cell septum thickness (Tc) A honeycomb structure object given in claim 9 characterized by having the relation of 1.10 <=(Tr1-Tr 10-40)/Tc<=3.00 thru/or any 1 term of 16.
[Claim 18] A honeycomb structure object given in claim 1 characterized by the value of the porosity (%) in less than 30mm a part or all of a septum part being [five or more] smaller than the value of the porosity (%) in other septum parts from the opening end face of one side of a honeycomb structure object, or both thru/or any 1 term of 17.
[Claim 19] The honeycomb structure object according to claim 18 characterized by the die length from the opening end face of a septum part with the value of said porosity small [five or more] not being uniform.
[Claim 20] A honeycomb structure object given in claim 1 characterized by the wall thickness of the cel septum in the opening end face of one side of a honeycomb structure object or both being thicker than the wall thickness of the cel septum in other parts thru/or any 1 term of 19.
[Claim 21] A honeycomb structure object given in claim 9 characterized by said Tc being Tc<=0.056mm thru/or any 1 term of 20.
[Claim 22] A honeycomb structure object given in claim 1 characterized by B shaft flexural strength being 0.8 or more MPas thru/or any 1 term of 21.
[Claim 23] A honeycomb structure object given in claim 1 characterized by coming to be formed from one sort or two sorts or more of ingredients chosen from the group which a honeycomb structure object becomes from cordierite, an alumina, a mullite, silicon nitride, aluminum titanate, a zirconia, and silicon carbide thru/or any 1 term of 22.
[Claim 24] the cross-section configuration of a honeycomb structure object -- a circle, an ellipse, an ellipse, a trapezoid, a triangle, a square, a hexagon, or right and left -- a honeycomb structure object given in claim 1 characterized by being an unsymmetrical variant configuration thru/or any 1 term of 23.
[Claim 25] A honeycomb structure object given in claim 1 characterized by the cross-section configuration of a cel being a triangle or a hexagon thru/or any 1 term of 24.
[Claim 26] A honeycomb structure object given in claim 1 characterized by using a honeycomb structure object for the support for motor exhaust purification catalysts thru/or any 1 term of 25.
[Claim 27] A honeycomb structure object given in claim 1 characterized by for a catalyst component being supported by the cel septum of a honeycomb structure object, being grasped by the peripheral face of an

outer wall, and being included in the catalytic converter thru/or any 1 term of 26.
[Claim 28] A honeycomb structure object given in claim 1 characterized by forming the intersection of the cel septum of a honeycomb structure object so that it may have the radius of curvature of 1.2mm or less thru/or any 1 term of 27.
[Claim 29] A honeycomb structure object given in claim 1 characterized by forming the intersection when said cel septum and said honeycomb outer wall touch so that it may have the radius of curvature of 1.2mm or less thru/or any 1 term of 28.
[Claim 30] The cel septum of the porosity which forms the complex of two or more cels which adjoined, respectively, It is the manufacture approach of the honeycomb structure object indicated by claim 1 which consisted of honeycomb outer walls of the porosity which surrounds and holds the outermost periphery cel located in the outermost periphery of this cel complex thru/or any 1 term of 29. Said talc component contains at least the particle talc which has 2/3 or less mean particle diameter of the coarse-grain talc which has the mean particle diameter of 7 micrometers or more, and said coarse-grain talc including a talc component and a kaolin component. And the manufacture approach of the honeycomb structure object characterized by manufacturing using the raw material with which said kaolin component contains the particle kaolin which has 2/3 or less mean particle diameter of the coarse-grain kaolin which has the mean particle diameter of 7 micrometers or more, and said coarse-grain kaolin.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Especially this invention relates to the especially suitable honeycomb structure object for the support for automobile exhaust purification etc. which was able to balance the endurance of the purification engine performance and an end face, and canning nature, and its manufacture approach about a porosity honeycomb structure object and its manufacture approach.
[0002]
[Description of the Prior Art] The porosity honeycomb structure object is widely used for filters, such as catalyst support, such as catalyst support for automobile exhaust purification, and a filter for diesel-power-plant exhaust gas, etc. When used for emission gas purification, such as such an automobile engine, it is in the inclination for emission control to be tightened up every year, from consideration of an environmental problem, and the emission-gas-purification catalyst is asked for improvement in the purification engine performance that it should correspond to this. On the other hand, from the field of engine development, orientation of low fuel consumption and a high increase in power is shown notably, and the emission-gas-purification catalyst is asked also for reduction of pressure loss that it should correspond to such a situation. Then, in order to solve such a problem, a honeycomb structure object is making thickness of the septum much more thin, raising permeability and reducing pressure loss, moreover the emission-gas-purification catalyst was lightweight-ized, heat capacity was reduced, and the motion which raises the purification engine performance at the time of warming up has become strong.
[0003] On the other hand into the exhaust gas discharged from an engine, various foreign matters may enter, there is a problem that a honeycomb structure object is shaved off by these (erosion), and amelioration of erosion-proof nature is also called for.
[0004] In order for improvement in purification engine performance, such as such formation of low-fever capacity and pressure loss, and the improvement in erosion-proof nature to conflict generally and to realize [for example,] low-fever capacity-ization, if the porosity of a honeycomb structure object is raised or wall thickness is made thin, the reinforcement as a honeycomb structure object will fall and erosion-proof nature will fall.
[0005] Moreover, in such an application, improvement in canning nature to which a gap does not take place in the reinforcement or the low retention span which bears it at this although it is necessary to grasp a honeycomb structure object by fixed reinforcement so that a gap of a can and a honeycomb structure object may not take place in the case of use, although grasped and used for a metal can etc. through grasping material is called for.
[0006] As a means to solve erosion-proof nature, the honeycomb structure object which made only the septum near the opening end face thick, and the honeycomb structure object with which eburnation of the opening end face was carried out to the opening end face of the base material of honeycomb structure by applying and calcinating glass components, such as a cover coat and water glass, are indicated by JP,2000-51710,A, for example. However, although the porosity of an opening end face is indicated to be 5 - 35% by this number official report, only the honeycomb structure object whose porosity of other parts is 36% is indicated, and, now, coexistence of the formation of low-fever capacity, erosion-proof nature, and the Canning nature cannot be aimed at. Moreover, porosity, septum thickness, and the relation of surface roughness are not described at all.
[0007] In order to improve canning nature, in case a honeycomb structure object is extruded, the honeycomb structure object which prepared irregularity in the outer wall front face by the approach of giving vibration is indicated by JP,2-207846,A. However, since this approach has the problem on which a septum is turned

off in case it is extrusion, when septum thickness becomes thin, it is difficult to apply to the thin honeycomb structure object of a septum. Moreover, while preparing irregularity in an outer wall front face by spraying sandblasting and a ceramic raw material on a front face at JP,2-86847,A, a honeycomb structure object with the granularity of a concave convex coarser than other fields and its manufacture approach are proposed. However, by this approach, an additional process is needed, and it is not economically desirable. Moreover, porosity, septum thickness, and the relation of surface roughness are not described at all by these official reports, either, and neither erosion-proof nature nor low-fever capacity-ization is considered.

[0008]

[Problem(s) to be Solved by the Invention] This invention is made in view of an above-mentioned problem, and fills improvement in the purification engine performance of a honeycomb structure object, and the demand on erosion-proof nature and a canning disposition with sufficient balance, and it aims at offering a suitable honeycomb structure object especially as support for motor exhaust purification catalysts etc. This invention aims further to let the above-mentioned honeycomb structure object, especially porosity offer the manufacture approach of the good honeycomb structure object of canning nature small.

[0009]

[Means for Solving the Problem] Although it is generally necessary to enlarge porosity, to make a cel septum thin and to make it the reverse, for raising erosion-proof nature in order to attain low-fever capacity-ization as a result of doing research including various trials, in order that this invention person may attain the above-mentioned purpose When septum thickness became thin, it found out that good erosion-proof nature was obtained by making a septum thin, when the effect which it has on the erosion-proof nature of porosity attains a header and the same heat capacity for becoming larger, and making porosity small. Moreover, although canning nature will fall if porosity is stopped to less than 30% That this cause is because the outer wall front face became smooth A header, Average surface roughness (Ras) by setting the average height (RzDINs) from the maximum point on 0.5 micrometer<=Ras <=10micrometer and/or the front face of an outer wall to the following minimum point to 5 micrometer<=RzDINs <=50micrometer While finding out that canning nature was improvable, the pole diameter found out that pore 1 micrometers or more could attain Above Ras and RzDINs by carrying out to more than 90 capacity % of total pore volume. The 1st invention is based on the above-mentioned knowledge.

[0010] Namely, the porous cel septum by which the first invention forms two or more complex of a cel which adjoined, respectively, It is the honeycomb structure object which consisted of honeycomb outer walls of the porosity which surrounds and holds the outermost periphery cel located in the outermost periphery of this cel complex. While porosity is less than 30% 5% or more and the basic wall thickness (Tc) of said septum is 0.030 mm<=Tc<0.076mm The average surface roughness (Ras) of an outer wall offers the honeycomb structure object characterized by the average height (RzDINs) from the maximum point on 0.5 micrometer<=Ras <=10micrometer and/or the front face of an outer wall to the following minimum point being 5 micrometer<=RzDINs <=50micrometer.

[0011] this invention -- setting -- Ras -- 0.5 micrometer<=Ras <=10micrometer -- it is -- and RzDINs -- 5micrometer<=RzDINs<= -- it is desirable that Ras is 1.0 micrometer<=Ras <=10micrometer preferably, and RzDINs is 10 micrometer<=RzDINs <=50micrometer 50 micrometers at the point which raises canning nature further, and it is desirable that the numerical aperture (P) of a honeycomb structure object is 83% or more at the point which reduces heat capacity and pressure loss and raises the purification engine performance. Moreover, as for the thickness of an outer wall, it is desirable from a viewpoint on a canning disposition that it is 0.076mm or more. Moreover, it is desirable at the point that it enlarges Ras and RzDINs that the average surface pole diameter of an outer wall is larger than the interior pole diameter of an average. Moreover, the average surface roughness (Rac) of a cel septum has the desirable average height (RzDINc) from the maximum point of 0.5 micrometers or more and/or a cel septum front face to the following minimum point at the point that that it is 5 micrometers or more raises the support force of a catalyst. Furthermore, in a honeycomb structure object, it is desirable that the pore which has the pole diameter of 1 micrometers or more is 90% or more of total pore volume at the point which enlarges Ra and RzDIN.

[0012] Moreover, the 5-20th which follow the method of inside from there considering an outermost periphery cel as 1st origin cel [1st] Each cel septum thickness (Tr1-Tr 5-20) to one 1st terminal point cel of the 5-15th within the limits preferably between said primitive cell septum thickness (Tc) 1.10 <=(Tr1-Tr 5-20)/Tc<=3.00 -- 1.10 <=(Tr1-Tr 5-20)/Tc<=2.50 and having the relation of 1.20 <=(Tr1-Tr 5-20)/Tc<=1.60 still more preferably preferably While improving erosion-proof nature further, it is desirable by raising AISO static reinforcement at the point which raises canning nature. The following cel which adjoins the 1st terminal point cel in the inner direction in this case, as 1st origin cel [2nd] Substantially each cel septum

thickness to one within the 3-5th limits which follow the method of inside from there of the 2nd terminal point cels Uniform thickness, It is desirable to make it change so that it may become the shape of reverse trapezoidal shape or a spool, and it may become thin one by one toward the method of inside, and to make the thickness of the thinest part in agreement with primitive cell septum thickness (Tc).
[0013] Moreover, while having the relation of 1.10 <=Tr1/Tc<=3.00 between said primitive cell septum thickness (Tc), the cel septum thickness (Tr1) of an outermost periphery cel Each cel septum thickness (Tr1-Tr 5-20) to one within the 5-20th limits which follow the method of inside from there of the 3rd terminal point cels an outermost periphery cel as 1st origin cel [3rd] between primitive cell septum thickness (Tc) It has the relation of 1.20 <=(Tr1-Tr 5-20)/Tc<=1.60 still more preferably. 1.10 <=(Tr1-Tr 5-20)/Tc<=3.00 -- desirable -- 1.10 <=(Tr1-Tr 5-20)/Tc<=2.50 -- It is desirable to make it change so that it may become thin one by one toward the inner direction, and to also make the thickness of the thinest part in agreement with primitive cell septum thickness (Tc) so that the cross section of each cel septum may become reverse trapezoidal shape or the shape of a spool, and uniform thickness.
[0014] When the cross section of a honeycomb structure object is two or more [160cm] An outermost periphery cel as 1st origin cel [1st] to one within the 10-40th limits which follow the method of inside from there of the 1st terminal point cels Each cel septum thickness (Tr1-Tr 10-40) between primitive cell septum thickness (Tc) 1.10 <=(Tr1-Tr 10-40)/Tc<=3.00 -- it is preferably desirable 1.10 <=(Tr1-Tr 10-40)/Tc<=2.50 and to have the relation of 1.20 <=(Tr1-Tr 10-40)/Tc<=1.60 still more preferably.
[0015] Furthermore, it is desirable at the point that that the value of the porosity (%) in less than 30mm a part or all of a septum part is [five or more] smaller than the value of the porosity (%) in other septum parts raises the erosion-proof nature of an end face from the opening end face of one side of a honeycomb structure object, or both, and it is desirable that the die length from the opening end face of a part with the small value of porosity is not uniform, either at the point of aiming at coexistence of erosion-proof nature and low-fever capacity. Furthermore, the wall thickness of the cel septum in the opening end face of one side of a honeycomb structure object or both is desirable at the point that it raises erosion-proof nature that it is also thicker than the wall thickness of the cel septum in other parts.
[0016] Thus, it is desirable when being able to make basic wall thickness (Tc) still thinner, and being referred to as Tc<=0.056mm thickening the cel septum near the periphery of a honeycomb structure object and/or by strengthening an opening end face achieves low-fever capacity-ization.
[0017] Furthermore, as for the honeycomb structure object of this invention, it is desirable that the flexural strength of B shaft is 0.8 or more MPas, and it is desirable to come to be formed from one sort or two sorts or more of ingredients chosen from the group which consists of cordierite, an alumina, a mullite, silicon nitride, aluminum titanate, a zirconia, and silicon carbide. moreover, the cross-section configuration of a honeycomb structure object -- a circle, an ellipse, an ellipse, a trapezoid, a triangle, a square, a hexagon, or right and left -- it is desirable that it is an unsymmetrical variant configuration, and it is desirable that the cross-section configuration of a cel is also a triangle or a hexagon. Furthermore, it is desirable that the intersection of the cel septum of a honeycomb structure object is formed so that it may have the radius of curvature of 1.2mm or less, and it is also desirable to be formed so that the intersection when a cel septum and an outer wall touch may have the radius of curvature of 1.2mm or less.
[0018] As for the honeycomb structure object of this invention, it is desirable to be used for the support for motor exhaust purification catalysts, and it is also desirable for a catalyst component to be supported by the cel septum, and for it to be grasped by the peripheral face of an outer wall, and to be included in the catalytic converter.
[0019] this invention person etc. found out that the honeycomb structure object which made porosity small could be manufactured economically by using combining the specific talc and the specific kaolin of particle size as a raw material, making surface roughness coarse, as a result of considering the manufacture approach of a honeycomb structure object of having the above-mentioned property.
[0020] Namely, the porous cel septum by which the 2nd invention forms two or more complex of a cel which adjoined, respectively, It is the manufacture approach of the honeycomb structure object indicated by claim 1 which consisted of honeycomb outer walls of the porosity which surrounds and holds the outermost periphery cel located in the outermost periphery of this cel complex thru/or any 1 term of 29. Said talc component contains at least the particle talc which has 2/3 or less mean particle diameter of the coarse-grain talc which has the mean particle diameter of 7 micrometers or more, and said coarse-grain talc including a talc component and a kaolin component. And the manufacture approach of the honeycomb structure object characterized by manufacturing using the raw material with which said kaolin component contains the particle kaolin which has 2/3 or less mean particle diameter of the coarse-grain kaolin which has the mean

particle diameter of 7 micrometers or more, and said coarse-grain kaolin is offered.
[0021]
[Embodiment of the Invention] Hereafter, although this invention is explained based on the gestalt of suitable operation, this invention is not limited to the gestalt of the following operations.
[0022] The honeycomb structure object 1 of this invention consists of a cel septum 2 of the porosity which forms the cel 3 of the plurality penetrated to shaft orientations as shown in drawing 1 (a), (b), and (c) which adjoined, respectively, and a porous honeycomb outer wall 4. In addition, in this invention, especially, a cross section means the vertical section to shaft orientations, as long as there is no notice.
[0023] The porosity of the cel septum 2 by which the description of this invention constitutes the honeycomb structure object 1, and the whole outer wall 4 is less than 30% 5% or more, The thickness (Ts) of a septum 2 is 0.030 mm<=Tc<0.076mm, It is that the average surface roughness (Ras) of an outer wall 4 satisfies three requirements of the average height (RzDINs) from the maximum height of 0.5 micrometer<=Ras <=10micrometer and/or outer wall 4 front face to the following minimum height being 5 micrometer<=RzDINs <=50micrometer to coincidence. Erosion-proof nature is improvable by making porosity into less than 30% 5% or more, and setting Ts to 0.030 mm<=Tc<0.076mm, attaining low-fever capacity-ization. In this case, if porosity is made into less than 30%, a wall surface becomes smooth too much, and although canning nature falls, when 0.5 micrometer<=Ras <=10micrometer and/or RzDINs set Ras to 5 micrometer<=RzDINs <=50micrometer, good canning nature will be obtained. At less than 5%, heat capacity becomes [porosity] large too much, and the amount of erosion becomes [porosity] large too much at 30% or more. By 0.076mm or more, heat capacity becomes [Tc] large too much, in less than 0.03mm, the reinforcement of a septum runs short and the amount of erosion becomes large too much. Here, porosity is made into 30% or more, and about Tc, although it is possible to obtain the heat capacity same also as less than 0.076mm as the thing of this invention, the amount of erosion becomes large too much in this case. Moreover, by less than 5 micrometers, canning nature falls [Ras / less than 0.5 micrometers and RzDINs] too much, and if Ras is larger than 10 micrometers and RzDINs is larger than 50 micrometers, while irregularity will be too large and the variation in a path will become large too much, it falls and becomes easy for the pore in a honeycomb structure pair to increase too much, and to damage reinforcement. In this invention, it is desirable to fulfill to coincidence that they are that it is 0.5 micrometer<=Ras <=10micrometer and 5 micrometer<=RzDINs <=50micrometer, and it is desirable to fulfill to a pan that they are that it is 1.0 micrometer<=Ras <=10micrometer and 10 micrometer<=RzDINs <=50micrometer at coincidence.
[0024] In this invention, porosity shows the volume of the pore in the porous body to the volume of the whole porous body which forms the cel septum 2 and an outer wall 4 (hole) with 100 molar fractions. Moreover, basic wall thickness (Tc) means the thinnest wall thickness of the cel septum of the honeycomb structure object 1. In this invention, although it is desirable that it is uniform to the whole as for wall thickness, when thickening wall thickness of the cel septum by the side of the periphery section, it is desirable to make uniform wall thickness of the cel septum of the other inside part, and the wall thickness of this inside part turns into basic wall thickness (Tc) in this case. Moreover, when thickening about ten opening end face [of a honeycomb structure object] wall thickness, it is desirable to consider as uniform wall thickness except for that part, and the wall thickness of the septum except an about ten opening end face septum turns into basic wall thickness (Tc) in this case. It is computed as an average of the amount of displacement from an average line based on the result measured and obtained on the conditions explained to be average surface roughness (Ra) in the below-mentioned example. Moreover, with RzDIN It is computed as an average of the difference of the height of the lowest point for a valley-like portion which shows the following minimum from the height of the top-most vertices for a mountain-shaped portion of the arbitration which shows the maximum within limits measured on the same conditions as the above. Here, Ras and RzDINs show Ra and RzDIN of an outer wall 4 respectively, and Rac and RzDINc show Ra and RzDIN of the cel septum 2 respectively.
[0025] In this invention, it is desirable at the point that it enlarges Ras and RzDINs that the average surface pole diameter of an outer wall 4 is larger than the interior pole diameter of an average. Here, an average surface pole diameter means the pitch diameter of the pore which appears in the front face of an outer wall 4 as opening pore, and the interior pole diameter of an average means the pitch diameter of the pore which exists in the interior of an outer wall 4 as embarrassment pore. An average surface pole diameter can be made larger than the interior pole diameter of an average by carrying out to enlarging the ratio of pore with a big pole diameter in an outer wall 4, and 90% or more of all [in / pole diameter / preferably / in pore 1 micrometers or more / an outer wall 4] pore.

[0026] although the front face of the cel septum 2 will also tend to become smooth in this invention if porosity is made into less than 30% -- the average surface roughness (Rac) of a cel septum -- 0.5 micrometer<=Rac <=10micrometer and/or (RzDINc) 5micrometer<=RzDINc<= -- it is also desirable to be referred to as 1.0 micrometer<=Rac <=10micrometer and/or 10 micrometer<=RzDINc <=50micrometer still more preferably 50 micrometers. The support force of the catalyst at the time of making a catalyst support increases by this, and omission of a catalyst are prevented.
[0027] Porosity considers as less than 30% 5% or more as mentioned above. Ras 0.5 micrometer<=Ras <=10micrometer, Preferably 1.0 micrometer<=Ras <=10micrometer and/or RzDINs 5 micrometer<=RzDINs <=50micrometer, Preferably, in order that 0.5 micrometer<=Rac <=10micrometer and/or RzDINc may set to 5 micrometer<=RzDINc <=50micrometer, the average surface roughness (Rac) of 10 micrometer<=RzDINs <=50micrometer and/or the cel septum 2 In the cel septum 2 and outer wall 4 which constitute the honeycomb structure object of this invention, it is desirable that the pore which has the pole diameter of 1 micrometers or more carries out to more than 90 capacity % of total pore volume. By considering pore as such a configuration, irregularity with a detailed front face can be made and Above Ra and RzDIN can be attained easily.
[0028] Moreover, in this invention, since the fall of pressure loss can be carried out to a numerical aperture being 83% or more few and heat capacity can also be made small, the purification engine performance of the honeycomb structure object of this invention can be raised. A numerical aperture means what expressed with 100 molar fractions the ratio of the area which the pore divided with the cel, i.e., a septum, to the area of the honeycomb structure object opening end face 10 occupies here. A numerical aperture can be raised by making thin decreasing a cel consistency and/or a cel septum. Moreover, since the reinforcement at the time of Canning of support can be raised, it is desirable to set thickness of an outer wall 4 to 0.076mm or more.
[0029] In this invention, it is desirable at the point that thickening cel septum 2a by the side of the periphery section as shown in drawing 2 also raises erosion-proof nature. Moreover, since improvement in AISO static reinforcement is achieved and the retention span at the time of Canning can also be strengthened by thickening the cel septum 2 by the side of the periphery section, the Canning nature also improves. AISO static reinforcement is reinforcement shown with the pressurization pressure value at the time of destruction by the trial based on automobile specification JASO specification M505-87 here. In drawing 2 , an outer wall 4 is approached most, there is an outermost periphery cel 8, and the 2nd cel 9 is following the method of inside from the outermost periphery cel 8. It is Tr1 about the septum thickness of an outermost periphery cel, and Tr2 shows the septum thickness of this 2nd cel 9. Although illustration is not carried out, the thickness of the septum of one cel of the 5-15th within the limits is similarly expressed with Tr 5-15. In addition, the cel septum 2 is divided roughly into periphery cel septum 2a and primitive cell septum 2b.
[0030] As for the honeycomb structure object of this invention, it is desirable to carry out relation between each cel septum thickness (Tr1-Tr 5-15) and primitive cell septum thickness (Tc) to one within the 5-15th limits which follow the method of inside from there with an outermost periphery cel as the starting point of terminal point cels as [be / it / 1.10 <=(Tr1-Tr 5-15)/Tc<=3.00]. In order that this value [(Tr1-Tr 5-15) /Tc] may not contribute that it is less than 1.10 to improvement in erosion-proof nature and may not contribute to an improvement of AISO static reinforcement, either, it does not contribute to improvement in canning nature. Moreover, if 3.00 is exceeded, heat capacity and pressure loss will increase. Moreover, if it does not contribute to improvement in erosion-proof nature or AISO static reinforcement, but specification comes even out of the septum thickness of the cel of the 20th henceforth comparatively especially 15th henceforth and it thickens, even if specification comes out comparatively and it thickens septum thickness (Tr1-Tr4) of the 1-4th cels, while pressure loss will increase, heat capacity increases and is not more desirable than the mass of support increases more than predetermined, either.
[0031] As shown in drawing 3 , it sets on the honeycomb structure object made from a ceramic of this invention. The following cel which adjoins the 1st terminal point cel in the inner direction as 1st origin cel [2nd] Each cel septum thickness to one within the 3-5th limits which follow the method of inside from there of the 2nd terminal point cels The cross section of each cel septum by the shape of reverse trapezoidal shape (drawing 3 (a)), the shape of a spool (drawing 3 (b)), and a rectangle (it is uniform thickness for every cel) (drawing 3 (c)) And it is desirable to make it change so that it may become thin one by one toward the inner direction (for what is necessary to be just to make into within the limits of 1.10-3.00 the ratio made thin), and to make the thickness of the thinest part in agreement with primitive cell septum thickness (Tc). Thus, improvement in erosion-proof nature can be aimed at by constituting, suppressing the increment in heat capacity or pressure loss.
[0032] Moreover, in this invention, while having the relation of 1.10 <=Tr1/Tc<=3.00 between primitive

cell septum thickness (Tc), the cel septum thickness (Tr1) of an outermost periphery cel Each cel septum thickness (Tr1-Tr 5-20) to one within the 5-20th limits which follow the method of inside from there of the 3rd terminal point cels an outermost periphery cel as 1st origin cel [3rd] between primitive cell septum thickness (Tc) It has the relation of 1.10 <=(Tr1-Tr 5-20)/Tc<=3.00. The cross section of each cel septum as mentioned above by the shape of reverse trapezoidal shape, the shape of a spool, and a rectangle And it is desirable to make it change so that it may become thin one by one toward the inner direction, and to make the thickness of the thinest part in agreement with primitive cell septum thickness (Tc). Thus, by constituting, improvement in pressure loss or a thermal-shock-resistance ratio can be aimed at.

[0033] In this invention each of cel septum thickness (Tr1-Tr 5-20) moreover, between primitive cell septum thickness (Tc) As mentioned above, when considering as the conditions further limited so that it might have the relation of 1.20 <=(Tr1-Tr 5-20)/Tc<=1.60 in 1.10 <=(Tr1-Tr 5-20)/Tc<=2.50 and a pan takes heat capacity and pressure loss into consideration, it is desirable practically.

[0034] Moreover, there is an inclination which the opportunity for honeycomb support to be carried also in large-sized cars, such as a truck, in recent years increases, and it will be necessary to use the thing large-sized also as honeycomb support. In the case of large-sized honeycomb support, an outermost periphery cel (when the cross-section configuration of a honeycomb outer wall is circular, the diameter is about 144mm or more and the cross section is two or more [about 160cm]) as 1st origin cel [1st] in the 1st terminal point cel, the method of inside is followed from an outermost periphery cel -- preferably the 10-40th Carry out to to one cel of the 10-30th within the limits, and, on the whole, a thick-ized part is extended. Are desirable in each cel septum thickness (Tr1-Tr 10-30). (Tr1-Tr 10-40) the ratio (Tr1-Tr 10-40) to primitive cell septum thickness (Tc) -- /Tc -- preferably /(Tr1-Tr 10-30) Tc usually It is desirable 1.10-2.50, and to constitute a 1.10-3.00, and practical use top further practically, so that it may be set to 1.20-1.60.

[0035] In this invention, in order to improve erosion-proof nature further, it is desirable to make smaller [five or more] than the value of the porosity of the cel septum of other parts the value of all or a part of porosity of the cel septa 2 which is in shaft orientations in the range B of less than 30mm from the opening end face 10. This means making the part or all the porosity of the cel septum 2 in Range B into 23% or less, when the porosity of the usual cel septum 2 (cel septum of parts other than Range B) is 28%. In this case, although the die length from the opening end face 10 which makes porosity small may be uniform, it is desirable to take the die length of arbitration among 0-30mm every septum 2, i.e., for this die length not to be uniform. By not making it uniform, the stress concentration of the boundary part from which porosity changes can be eased.

[0036] Moreover, in order that making all or a part of wall thickness of the cel septa 2 in the above-mentioned range B thicker than the wall thickness of the cel septum 2 of other parts may also raise erosion-proof further, it is desirable, and it is desirable that the thick field of wall thickness takes the die length of arbitration among 0-30mm every septum 2 also in this case, i.e., this die length is not uniform, at the point which eases stress concentration like the above.

[0037] As mentioned above, it is effective to thicken the cel septum by the side of the periphery section of the honeycomb structure object 1, to make small the porosity of an about ten opening end face septum, or to thicken an outer wall, when especially the thickness of a septum is thin, and it is desirable that septum thickness Tc is Tc<=0.056micrometer in this case.

[0038] Moreover, by setting B shaft reinforcement to 0.8 or more MPas, when the breakage at the time of the foreign matter in exhaust gas colliding with a septum can be reduced and erosion-proof nature is raised, it is desirable. B shaft reinforcement is prescribed by JASO specification M505-87, and means the reinforcement which started the sample to shaft orientations and was measured in the direction which met the perpendicular and the cel septum here.

[0039] The thing which it comes to form from at least one sort of ingredients chosen from the group which consists of cordierite, an alumina, a mullite, silicon nitride, aluminum titanate, a zirconia, and silicon carbide, for example as the cel septum used for this invention and a honeycomb outer wall can be mentioned.

[0040] moreover -- as the cross-section configuration of the honeycomb structure object of this invention -- a circle, an ellipse, an ellipse, a trapezoid, a triangle, a square, a hexagon, or right and left -- an unsymmetrical variant configuration can be mentioned. Especially, a circle, an ellipse, and an ellipse are desirable.

[0041] Moreover, although there is especially no limit as a configuration of the cross section of the cel used for this invention, for example, it can mention considering as the shape of a polygon more than a triangle, for example, a square, a rectangle, and a hexagon, and it is desirable that they are a triangle, a square, or the

hexagons especially.
[0042] Although there is especially no limitation in the application of the honeycomb structure object of this invention and it can use for various applications, such as various filters and catalyst support, especially the thing used for the support for motor exhaust purification is desirable. Moreover, as for the honeycomb structure object of this invention, it is desirable to be used including in a catalytic-converter container, as shown in drawing 4 . Here, in the converter container 11, by the peripheral face, the honeycomb structure object 13 is grasped with a ring 12, and is incorporated. Although there is especially no limit as a ring 12, the thing made from a metal mesh is usually used. In addition, it is desirable to make the grasping material 14, such as a mat and a cross, intervene between the converter container 11 and the peripheral face of the honeycomb structure object 13.
[0043] The septum which carries out padding (contact padding) or adjoins the part where the outermost periphery cel septum and outer wall of a honeycomb structure object touch in moreover, the part where between septa touches an outer wall with narrowing Thickness of a cel septum may be relatively made thin, carrying out padding (V character connection padding) inside an outer wall among those septa at least, and maintaining effectiveness, such as improvement in above-mentioned highly-precise-izing of a septum (cel septum) configuration, and AISO static reinforcement. It is desirable to specifically form the corner section of a cel so that it may have the radius of curvature of 1.2mm or less, and it is desirable that the intersection when a cel septum and a honeycomb outer wall touch forms so that it may have the radius of curvature of 1.2mm or less.
[0044] Next, the manufacture approach of the honeycomb structure object of this invention is explained. For example, the honeycomb structure object which makes cordierite the quality of the material For example, talc, a kaolin, a temporary-quenching kaolin, an alumina, an aluminum hydroxide, The chemical composition out of a silica is SiO2. 42 - 56 % of the weight, aluminum 2O3 30 - 45 % of the weight, MgO In the cordierite-ized raw material prepared by the predetermined rate so that it might go into 12 - 16% of the weight of the range Synthetic resin, such as 15 - 25 % of the weight and PET and PMMA, bridge formation polystyrene, and phenol resin, is added for graphite five to 15% of the weight as an ostomy agent, after specified quantity addition and water are added suitably, methyl cellulose and a surfactant are kneaded, and it considers as a plastic matter. Subsequently, after carrying out extrusion molding of this plastic matter to honeycomb structure after a vacuum deairing and drying by dielectric drying or microwave desiccation, and the hot-air-drying method, it can manufacture according to a series of processes of calcinating a maximum temperature among 1400-1435 degrees C.
[0045] Although 1/3 or less kaolin of the mean particle diameter of talc with a mean particle diameter of 7 micrometers or less and talc is generally used for talc with small mean particle diameter, and a concrete target in order to make porosity into 30% or less The description of this invention (2nd invention) combines 2/3 or less particle talc of the mean particle diameter of coarse-grain talc with a mean particle diameter of 7 micrometers or more and coarse-grain talc as a raw material. And it is combining 2/3 or less particle kaolin of the mean particle diameter of a coarse-grain kaolin with a mean particle diameter of 7 micrometers or more and a coarse-grain kaolin. By using such a combination, porosity and the honeycomb structure object whose surface roughness (Ras, RzDINs) of an outer wall is in the range of the first invention can be manufactured easily. The rates of 10 / 90 - 60/40, a coarse-grain kaolin, and a particle kaolin that the desirable rate of coarse-grain talc and particle talc is desirable are 10 / 90 - 60/40. Furthermore, it is desirable to fabricate using kneading equipment with which it becomes strong densely scouring the Banbury kneader, a pressurized kneader, a continuous-molding machine, etc. packing of a raw material, when manufacturing the coarse honeycomb structure object of surface roughness with more low porosity. in addition, mean particle diameter -- the Horiba make -- the weighted mean particle size which measured particle size distribution and was obtained by LA-910 (laser diffraction method) is said.
[0046]
[Example] Next, although an example explains this invention still more concretely, this invention does not receive a limit at all according to these examples. In addition, in the following examples, as long as there is no notice especially, % in a compounding ratio means weight %.
[0047] To 100% of raw materials shown in one to manufacture example 4 table 1 of a honeycomb structure object, hydroxypropyl-methylcellulose 8% and 0.5% of lauric-acid potash soap, and polyether 2%, 28% of water was mixed by the mixer, it supplied to the continuous-molding machine, and the honeycomb of 0.055mm of wall thickness, and cel consistency 900 cel / in2 (140 cels / cm2) was fabricated. This was cut in the predetermined dimension, and at 1430 degrees C of maximum temperatures, it held for 4 hours and calcinated.

To 100% of raw materials shown in the example 1 of a comparison, and two tables 1, methyl cellulose 4%, 0.7% of sodium stearate, and 28% of water were kneaded by the opening type sigma kneader, and it considered as the plastic matter. This was made into the cylinder-like plastic matter with the ******** machine, this was supplied to the extrusion-molding machine, and the honeycomb of 55 micrometers of wall thickness, and cel consistency 900 cel / in2 (140 cels / cm2) was fabricated. This was cut in the predetermined dimension, and at 1430 degrees C of maximum temperatures, it held for 4 hours and calcinated.

[0048] The average surface roughness (Ras) and RzDINs of the porosity of the honeycomb structure object acquired in examples 1-4 and the examples 1 and 2 of a comparison, an average pole diameter, and an outer wall were measured by the following approaches.

Measurement measuring device of porosity The sample 0.1g or more was started from the porosimeter (Micromeritics make, auto pore 9220 mold equipment) measurement-procedure (1) honeycomb-structure object.

(2) The sample was paid after 2-hour desiccation and to a container at 150 degrees C, and was set in equipment.

(3) The pressure which pours in mercury into a container and is equivalent to a regular pole diameter was applied, and it asked for the mercury volume absorbed by the sample.

(4) Pore distribution was calculated and searched for from a pressure and the absorbed mercury volume.

(5) Pore volume calculated and asked for the pressure of 68.6MPa(s) (700 kgf/cm2) from the mercury volume applied and absorbed.

(6) It asked for porosity by the following formulas from the total pore volume.

Porosity %= total pore volume (perg) x100/(total pore volume (perg) + 1/2.52)

Measurement specification of surface roughness: ISO 42871/1 measuring device: It is 90 degrees (direction shown by D in drawing 1 (b)) to the longitudinal direction of the product made from Taylor HOBUSON, a surface roughness configuration measurement machine, and a Form Talysurf S4C palpation tip radius:2micrometer reading-per-second:1 mm/sec measurement direction:cel septum front face. measurement die-length: -- about 25mm measurement part: -- five places of arbitration were measured twice each and the average was made into measured value.

[0049] The result was shown in Table 1. Although surface roughness Ras and the value of RzDINs became large, as for the honeycomb structure object acquired in the example 1 of a comparison, porosity has exceeded 30%. Although the honeycomb structure object acquired in the example 2 of a comparison became smaller [porosity] than 30%, the value of Ras and RzDINs has become small. The honeycomb structure object acquired in the examples 1-4 was that by which porosity, Ras, and RzDINs go into the range of the honeycomb structure object of this invention. From the above result, by using the manufacture approach of this invention showed that the honeycomb structure object porosity is less than 30% 5% or more, and is [object] 0.5 micrometer<=Ras <=5micrometer and/or 5 micrometer<=RzDINs <=50micrometer could be manufactured easily.

[0050]

[Table 1]

試験No.	調合割合(wt%)							焼成体の特性						
	タルクA(平均粒子径μm)	タルクB(平均粒子径μm)	カオリンA(平均粒子径μm)	カオリンB(平均粒子径μm)	アルミナ(平均粒子径μm)	水酸化アルミニウム(平均粒子径μm)	シリカ(平均粒子径μm)	平均粒子径比 タルクA/タルクB	平均粒子径比 カオリンA/カオリンB	A軸の熱膨張係数(×10⁻⁶/℃)	B軸の熱膨張係数(×10⁻⁶/℃)	気孔率(%)	平均径(μm)	外壁表面粗さ(μm)Ra	外壁表面粗さ(μm)RzDIN
実施例1	20 (12)	21 (8)	10 (10)	32* (3)	10 (5)	7 (2)	–	1/0.67	1/0.3	0.51	0.82	30	4.1	1.9	13.6
実施例2	5 (11)	35 (7)	5 (15)	32* (10)	8 (5)	13 (2)	2 (4)	1/0.84	1/0.67	0.54	0.85	28	3.6	1.7	12.1
実施例3	20 (7)	20 (4)	20 (7)	17 (2.5)	8 (3)	13 (1.5)	2 (2)	1/0.57	1/0.43	0.36	0.67	22	2.7	1.3	9.3
実施例4	10 (20)	30 (4)	12 (7)	10 (2.5)	16 (3)	12 (1.5)	10 (2)	1/0.2	1/0.43	0.81	1.12	26	8.6	1.5	10.5
比較例1	40 (8)	–	20 (6)	17* (6)	8 (5)	13 (2)	2 (4)	–	1/1	0.68	1.01	31	4.3	1.9	13.2
比較例2	41 (4.5)	–	20.5* (1)	25 (0.4)	13.5 (4)	–	–	–	1/0.4	0.63	0.82	27	1.8	0.4	4.0

*仮焼カオリン

[0051] By the same manufacture approach as examples 5 and 6 and the example 3 of a comparison, and four examples 1-4, it was cel consistency 900 cel / in2 (140 cels / cm2), and the honeycomb structure object (examples 5 and 6 and examples 3 and 4 of a comparison) of the cel septum thickness shown in Table 2 and porosity was created, and erosion-proof nature was evaluated by the following approaches.

[0052] The metal can by which the honeycomb structure object was grasped and held in the exhaust air port of a serial 4-cylinder and a gasoline engine with a displacement of 1.8l. in the evaluation honeycomb structure object of erosion-proof nature was connected. That is, the sample has been arranged to the engine latest. Next, the engine was operated on the conditions shown in drawing 5 , and 0.1g (silicon carbide, GC320, mean particle diameter of 50 micrometers) of abrasive grains was thrown in in the place where the rotational frequency became 6000rpm. Operation of an engine was continued on the conditions furthermore shown in drawing 5 , the abrasive grain was thrown once into the two cycle by having made 130 seconds into 1 cycle, and this was repeated continuously. a total abrasive grain input -- about 2 -- it changed to about

g-16g, several trials were performed, and the amount of erosion of a honeycomb structure object in case an abrasive grain input is 10g (wind erosion volume) was computed from the result. As shown in drawing 6 , after the amount of erosion twisted the rubber sheet around the processing end face of the side which measures the amount of erosion of the honeycomb structure object 1 and covered with the bead 20 made from a ceramic with a diameter of 1.5mm in height of about 3mm into it, they were collected, they measured the bead volume, measured it by taking the difference of the bead volume after an erosion trial, and the bead volume before a trial, and made the average which performed this 3 times the amount of erosion.

[0053] A result is shown in Table 2. Here, the bulk density of each honeycomb structure object was computed as an index of heat capacity. The sample of the example 3 of a comparison shows that bulk density is large and heat capacity is large, although erosion-proof nature was good. Although the sample of bulk density of the example 4 of a comparison is small and heat capacity was low, the amount of erosion is large and erosion-proof nature was bad. On the other hand, it turns out that the sample of examples 5 and 6 was improved with balance of erosion-proof nature and the formation of low-fever capacity low erosion-proof nature and bulk density and sufficient [bulk density]. Although the bulk density of especially the sample of examples 5 and 6 and the sample of the example 4 of a comparison, i.e., heat capacity, is near, the amount of erosion with few samples of examples 5 and 6 is shown, and it turns out that the honeycomb structure object of the invention in this application was attained with sufficient balance of improvement in the formation of low-fever capacity and erosion-proof nature.

[0054]

[Table 2]

	セル密度 (セル／cm^2)	基本隔壁厚 (mm)	肉厚部隔壁厚 (mm)	開口率(P) (%)	気孔率 (%)	投入量10gでのエロージョン量(cm^3)	嵩密度 (g／cm^3)
実施例5	140	0.066	0.066	85.1	28	2.0	0.291
実施例6	140	0.062	0.062	85.9	26	3.8	0.283
比較例3	140	0.086	0.086	80.7	35	1.8	0.336
比較例4	140	0.071	0.071	83.9	35	5.0	0.284

[0055] The honeycomb structure object respectively acquired in the example 6 and the example 4 of a comparison as an example 7, example of comparison 5 example 7, and an example 5 of a comparison was made to support a catalyst, and the same erosion-proof trial as the above was performed. Support of a catalyst was immersed into the solution containing an activated alumina and catalyst noble metals in the honeycomb structure object, and was performed by the ability being burned after removing an excessive solution. A result is shown in Table 3. Although erosion-proof nature improved by making a catalyst support from the example 7 and the example 5 of a comparison, the honeycomb structure object (example 7) of this invention showed erosion-proof nature better than the honeycomb structure object of the example 5 of a comparison also in this case.

[0056]

[Table 3]

触媒担持品	セル密度 (セル／cm^2)	基本隔壁厚 (mm)	肉厚部隔壁厚 (mm)	開口率(P) (%)	気孔率 (%)	投入量10gでのエロージョン量(cm^3)	嵩密度 (g/cm^3)
実施例7	140	0.062	0.062	85.9	26	0.4	0.283
比較例5	140	0.071	0.071	83.9	35	1.2	0.284

[0057] The surface roughness of the sample obtained in the example 5 and the example 4 of a comparison was measured by the above-mentioned approach, and it was shown in Table 4 with the result of the example 2 of a comparison. Moreover, pore distribution of these samples was measured by the same approach as the above. Furthermore, the Canning nature of these samples was measured by the following approaches. After winding grasping material (0.2 g/cm3) around the surroundings of the honeycomb structure object which is a sample and making the can made from SUS grasp, the maximum load (N) when keeping pushing a honeycomb structure object by push omission rate 1 mm/min. at the temperature of 600 degrees C was measured, and it considered as the index made from canning.

[0058] These results are shown in Table 4. The pore in which Ras(es) and RzDINs(es) of a sample of an example 5 and the example 4 of a comparison are 0.5 micrometers or more and 5 micrometers or more respectively, the samples of the example 2 of a comparison are Ras=0.4 and RzDINs=4 although the pore in which pore distribution has the pole diameter of 1 micrometers or more was more than 90 capacity %, and pore distribution has the pole diameter of 1 micrometers or more from Table 4 was 55 capacity %. Furthermore, although the push omission reinforcement of the sample of an example 5 and the example 4 of a comparison showed the Canning nature with a good example of 480N and 510N, and high reinforcement, it showed that the push omission reinforcement of the sample of the example 2 of a comparison was as low as 205 Ns, and the Canning nature was not enough.

[0059]
[Table 4]

	Ra_e (μm)	$RzDIN_e$ (μm)	押しぬき荷重 (N)
実施例5	1.7	11.9	480
比較例4	1.8	12.8	510
比較例2	0.4	4	205

[0060] After creating the sample (honeycomb structure object as shown in drawing 2) which thickened cel septum thickness to ten cels as [show / in Table 5] from the cel of the outermost periphery by the same approach as examples 1-4 to the method of inside to an example 8 and the example 6 of a comparison, next primitive cell septum thickness and making a catalyst support by the same approach as the above, the same approach as the above estimated erosion-proof nature. A result is shown in Table 5. Although the sample (example 8) of this invention had basic wall thickness very as thin as 0.056mm, comparatively good erosion-proof nature was shown. Although the sample obtained in the example 6 of a comparison also showed erosion-proof nature with basic wall thickness comparatively good 0.055mm and comparatively [thin], and periphery side-attachment-wall thickness was thicker than the sample of an example 8, more amounts of erosion than the sample of an example 8 were shown.
[0061]
[Table 5]

	セル密度 (セル／cm^2)	基本隔壁厚 (mm)	肉厚部隔厚 (mm)	開口率(P) (%)	気孔率 (%)	投入量10gでの エロージョン量(cm^3)
実施例8	140	0.056	0.072	86.3	27	1.0
比較例6	140	0.055	0.081	85.9	35	1.8

[0062] By the same approach as an example 9 and ten examples 1-4, 0.047mm in primitive cell septum thickness From an outermost periphery cel, to the method of inside 0.067mm in cel septum thickness to ten cels Create the sample of 27% of porosity and the catalyst was made to support with the same approach as the above, and after reducing the porosity of a 5mm part with 18% by the following approaches from the end face which exhaust gas hits further, the same approach as the above estimated erosion-proof nature.
[0063] The component by which the surface active agent was carried out 90% of the weight of the whole in particle SERUBEN (1-2 micrometers) solid content, and minute amount addition was carried out at 10% of the weight of the whole in colloidal silica (30 % of the weight of silica sols) solid content created, and after adding and mixing water with end-face porosity fall approach SERUBEN, water created the slurry of 60% of the weight of the whole ratio 40% of the weight of the whole by adding and mixing a silica sol, and adding and mixing a surface active agent further. Next, it took out picking and weight was measured, after carrying out stoving of the 150 degrees C of the honeycomb structure objects with a dryer for 1 hour or more. After leaving this honeycomb structure object until it becomes ordinary temperature, the slurry was put into the container to the end-face strengthening depth, and the honeycomb structure object was infiltrated for 1 - 2 seconds so that it might be attached to a container bottom. After lifting and shaking the honeycomb structure object and dropping liquid to some extent, internal liquid was removed in the air blow. After checking that there is no blinding, it dried with the dryer further in hot BURASUTA after desiccation (about 130 degrees C, a 2m [/second] wind speed, 3 minutes or more) (150 degrees C, 1 hours or more). This was calcinated on the baking conditions of the above-mentioned honeycomb structure object, and the porosity of an end face was reduced.
[0064] The result of the erosion-proof sex test of the sample (example 10) to which the porosity of the sample (example 9) which did not reduce the porosity of an end face to Table 6, and an end face was reduced is shown. Although the most amount of erosion (3.3cm3) was shown even if it thickened the cel septum by the side of the periphery section when primitive cell septum thickness was set to 0.047mm, the amount of erosion was improved by 3 1.8cm by reducing the porosity of an end face further.
[0065]
[Table 6]

	セル密度 (セル／cm^2)	基本隔壁厚 (mm)	肉厚部隔厚 (mm)	開口率(P) (%)	気孔率 (%)	投入量10gでのエロージョン量(cm^3)	端面の気孔率 (%)
実施例9	140	0.047	0.067	88.6	27	3.3	27
実施例10	140	0.047	0.067	88.6	27	1.8	18

[0066]
[Effect of the Invention] As mentioned above, erosion-proof nature, the formation of low-fever capacity, and canning nature are improved with sufficient balance, and the honeycomb structure object of this invention has them as various filters, catalyst support, especially catalyst support for motor exhaust purification. [useful] Moreover, the manufacture approach of the honeycomb structure object of this invention is an approach useful to manufacture of the honeycomb structure object which can manufacture easily and economically the coarse honeycomb structure object of the surface roughness of an outer wall and/or a cel septum while being low porosity, and has the above-mentioned special feature (good erosion-proof nature, low-fever capacity, and good Canning nature).

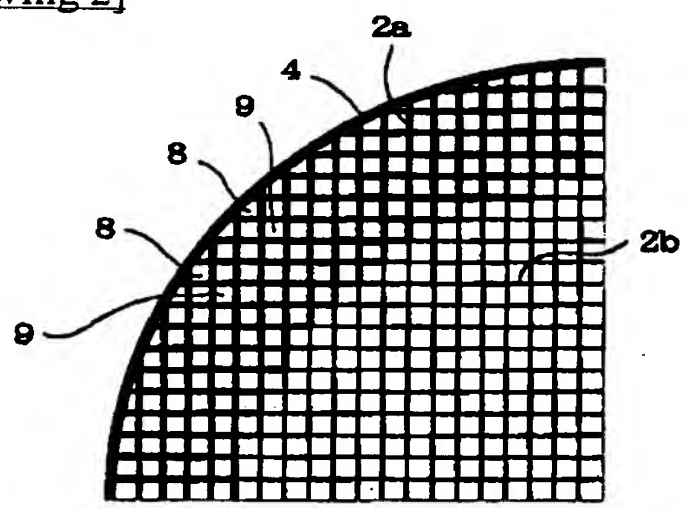
[Translation done.]

* NOTICES *

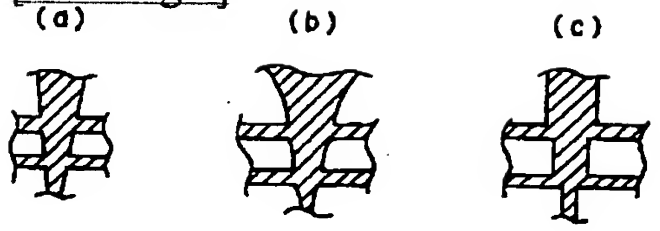
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

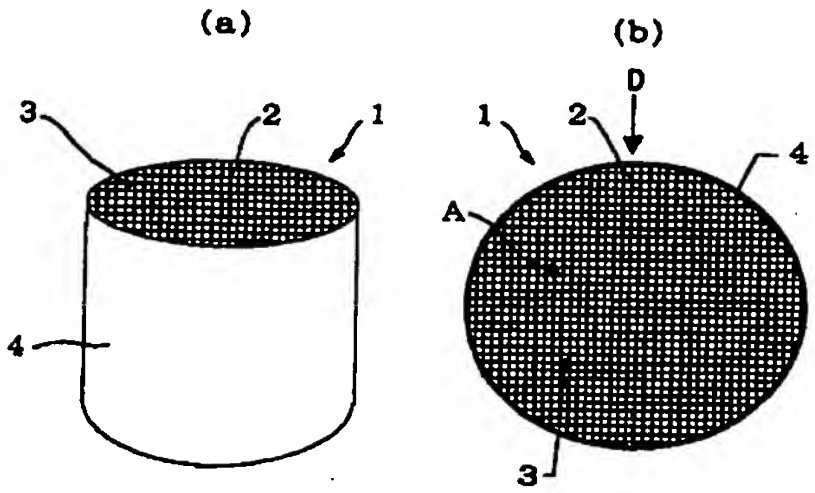
[Drawing 2]

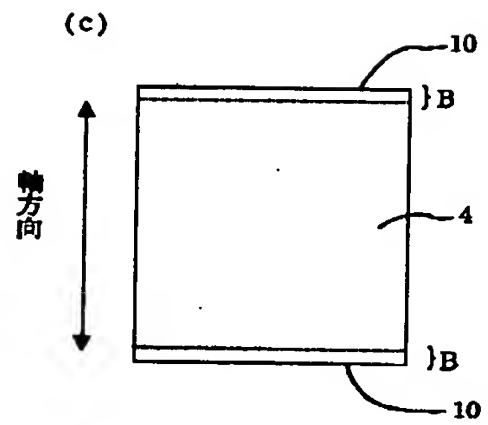


[Drawing 3]

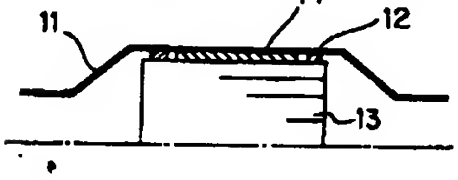


[Drawing 1]

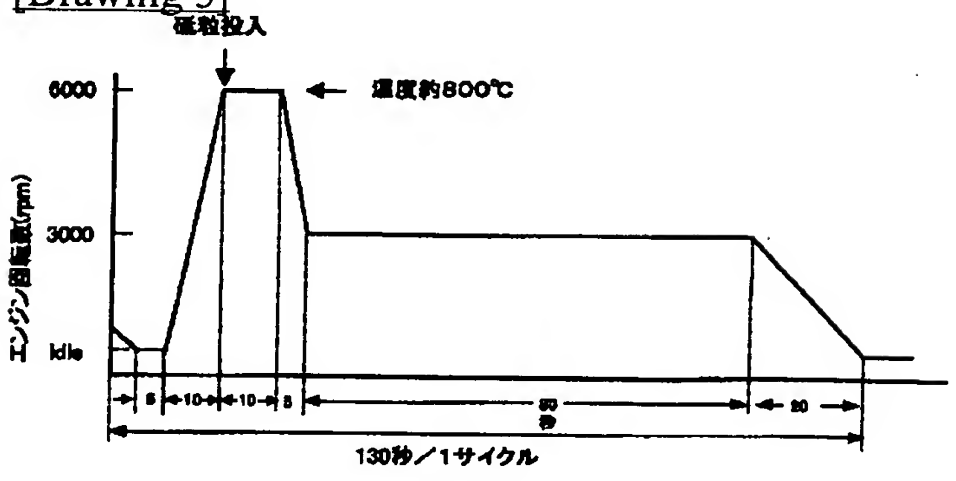




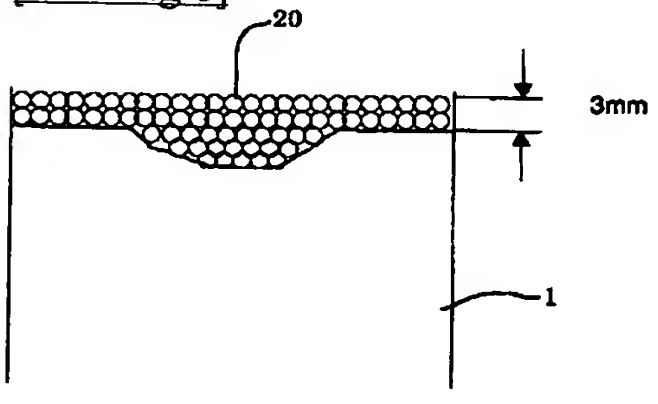
[Drawing 4]



[Drawing 5]



[Drawing 6]



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[Translation done.]